

InnovationXLab CarbonX Summit

Carbon to Chemicals: A Circular Value Chain

Wednesday, October 21, 2020



Moderator & Panelist

Dr. Robert Kumpf

Executive Specialist,
Deloitte Consulting



Panelist

Dr. Jill Martin

Fellow,
Packaging and Specialty
Plastics Division
Dow Inc.

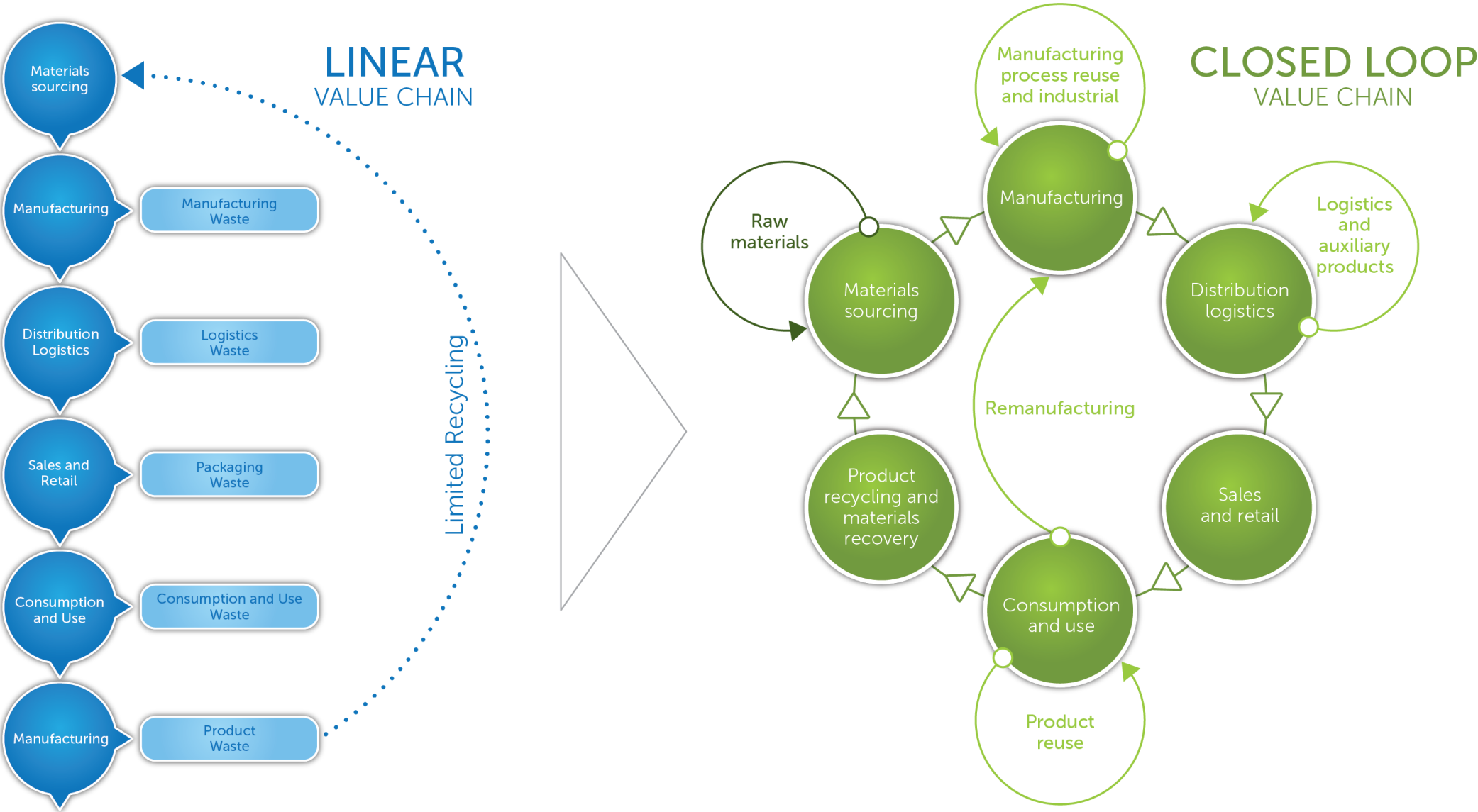


Panelist

Dr. Bryan Morreale

Executive Director,
Research & Innovation
Center
National Energy
Technology Laboratory

Circular Value Chain considers an entire ecosystem



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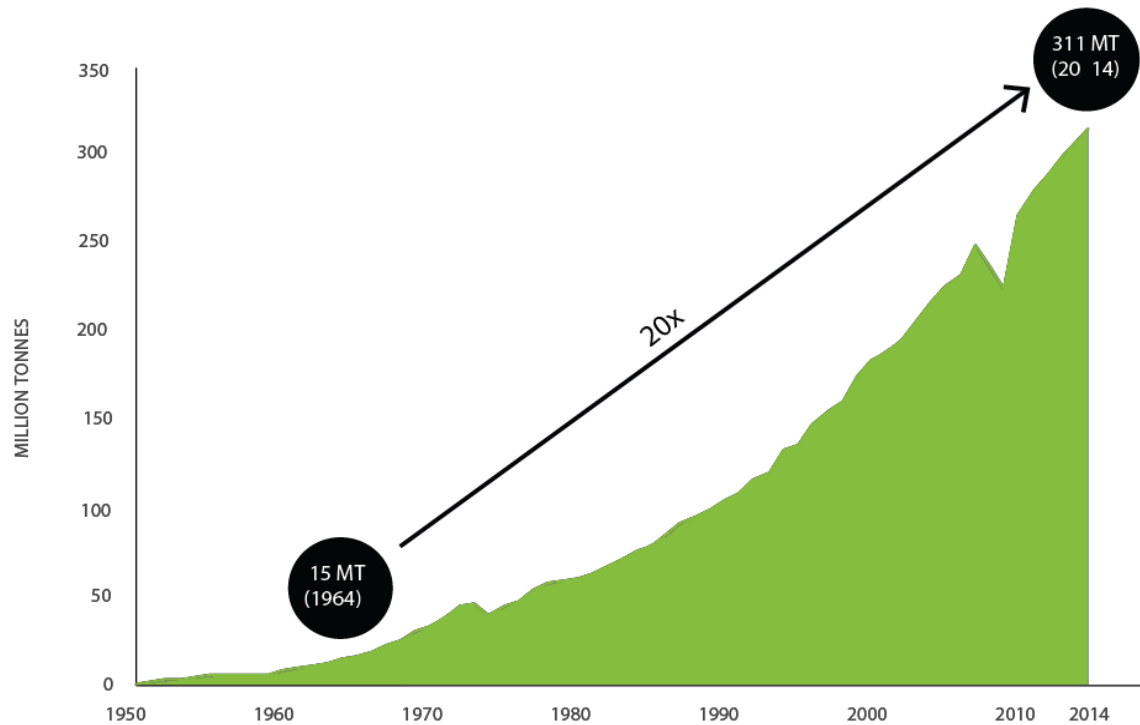


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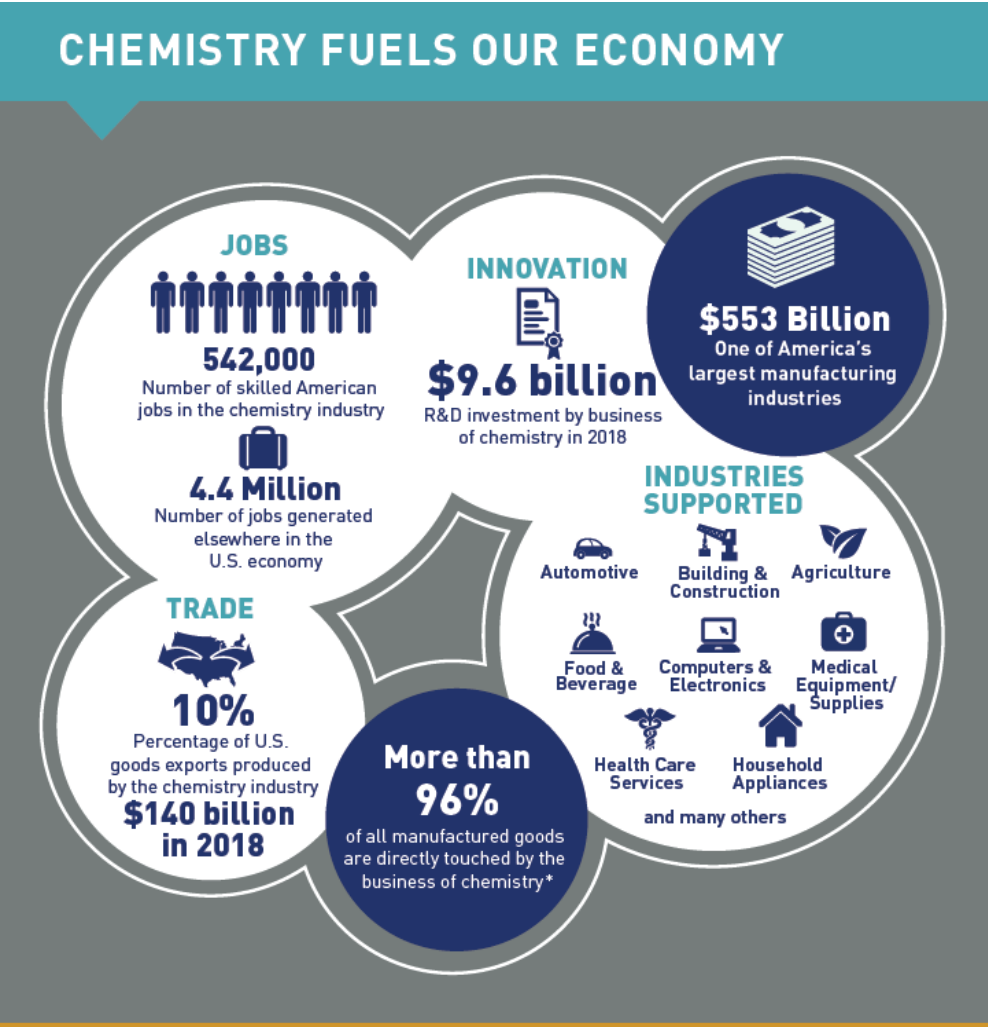
Executive Specialist,
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The chemical industry has enjoyed unprecedented growth in the modern economic era...

Figure 1: Growth in Global Plastics Production 1950–2014



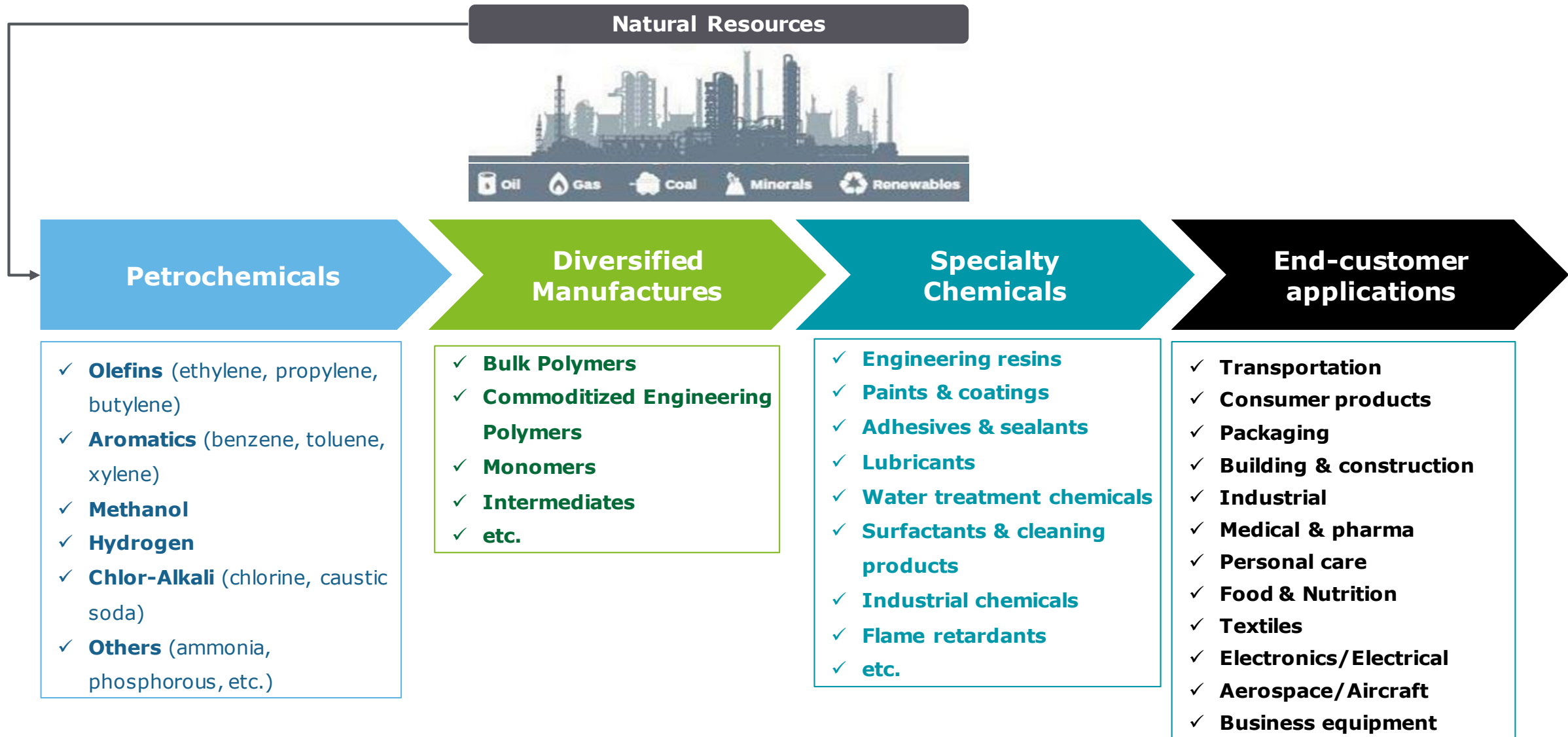
Note: Production from virgin petroleum-based feedstock only (does not include bio-based, greenhouse gas-based or recycled feedstock)
Source: PlasticsEurope, Plastics – the Facts 2013 (2013); PlasticsEurope, Plastics – the Facts 2015 (2015).



Source: American Chemistry Council (ACC), 2019 Guide to the Business of Chemistry, January 2020.

Note: Deloitte is an Associate Member of the ACC and receives membership access to the 2019 Guide to the Business of Chemistry report

The chemicals sector is quite diverse and complex with significant connections across the value chain



**How we got to today:
consumer goods boom
driven by innovations...**

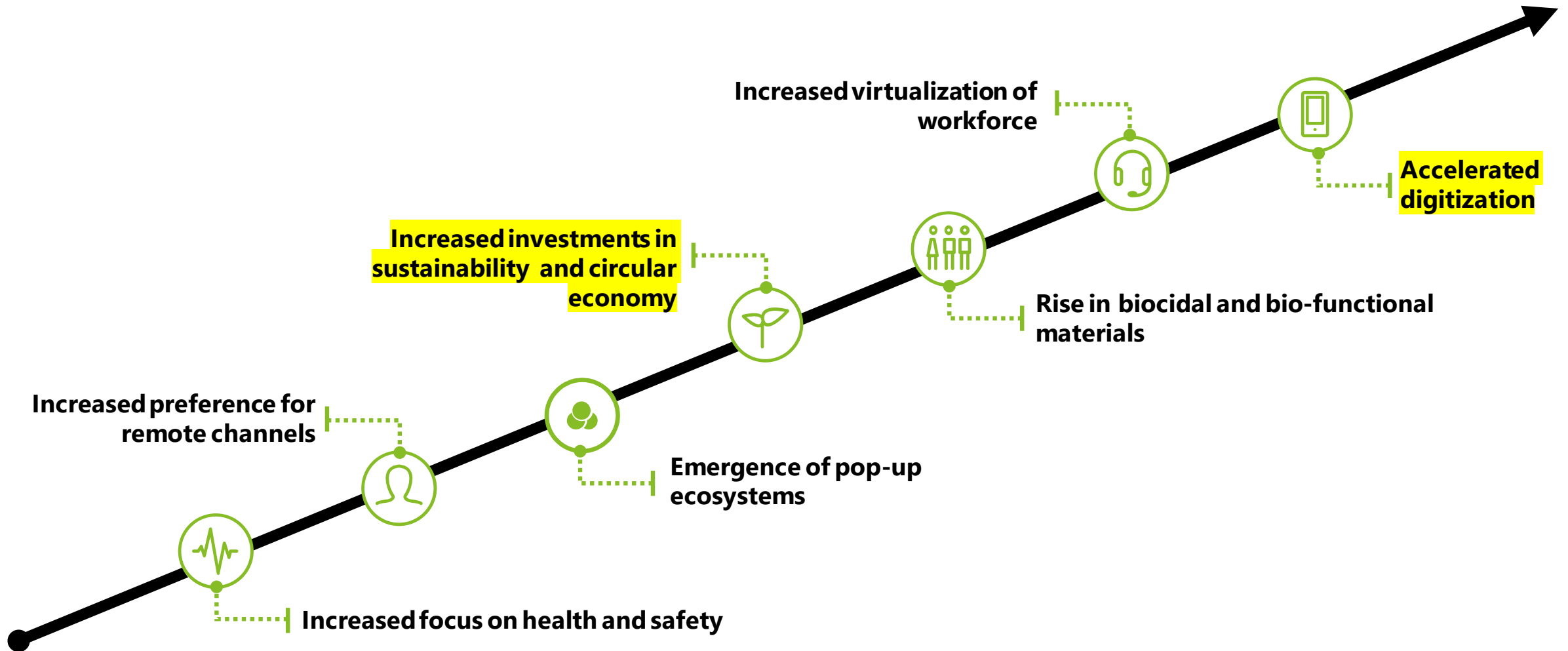


**...what has changed?
need for new, and
different, innovations**



Covid-10 Pandemic impact on Chemicals and Materials Sector – certain trends are accelerating

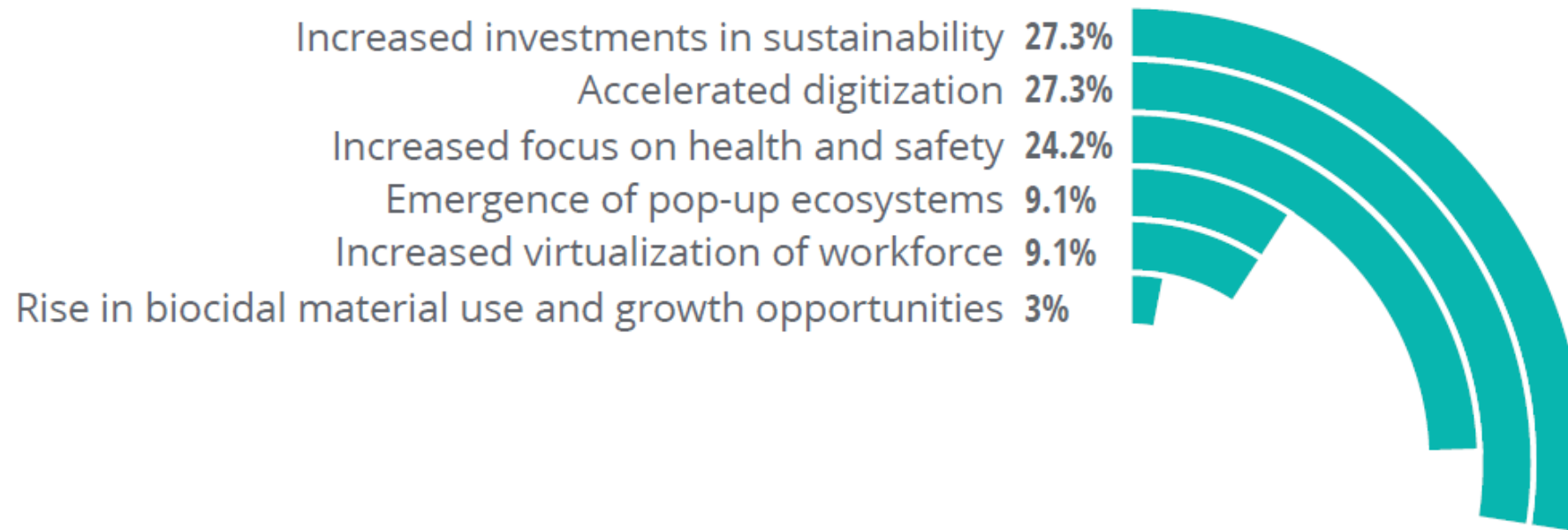
Certain key trends have begun to **accelerate** due to the crisis, re-shaping both demand and supply across industries



Investments in sustainability and digital will drive innovation in chemicals and materials

A sampling of industry executives see accelerating trends having significant impact on the chemicals and materials sector

Accelerating—greatest impact



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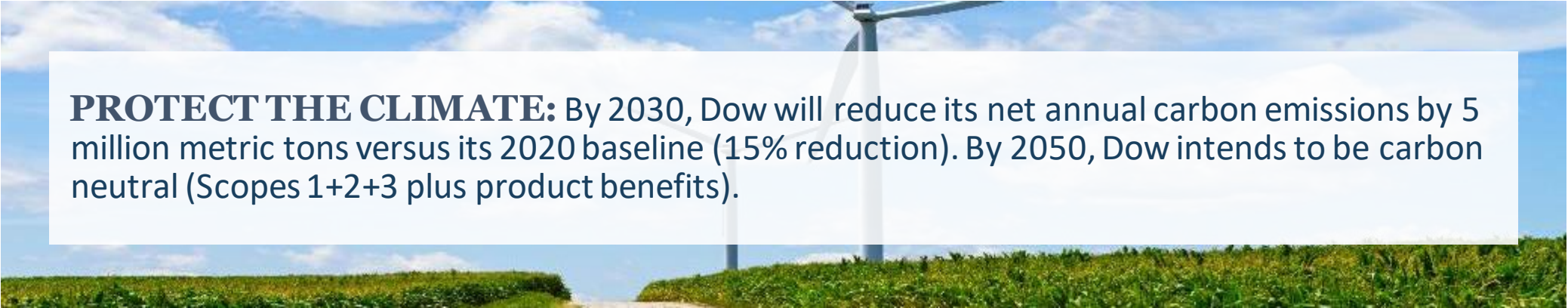
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Dow Inc.

FROM BIG TO BREAKTHROUGH : DOW'S SUSTAINABILITY TARGETS



PROTECT THE CLIMATE: By 2030, Dow will reduce its net annual carbon emissions by 5 million metric tons versus its 2020 baseline (15% reduction). By 2050, Dow intends to be carbon neutral (Scopes 1+2+3 plus product benefits).

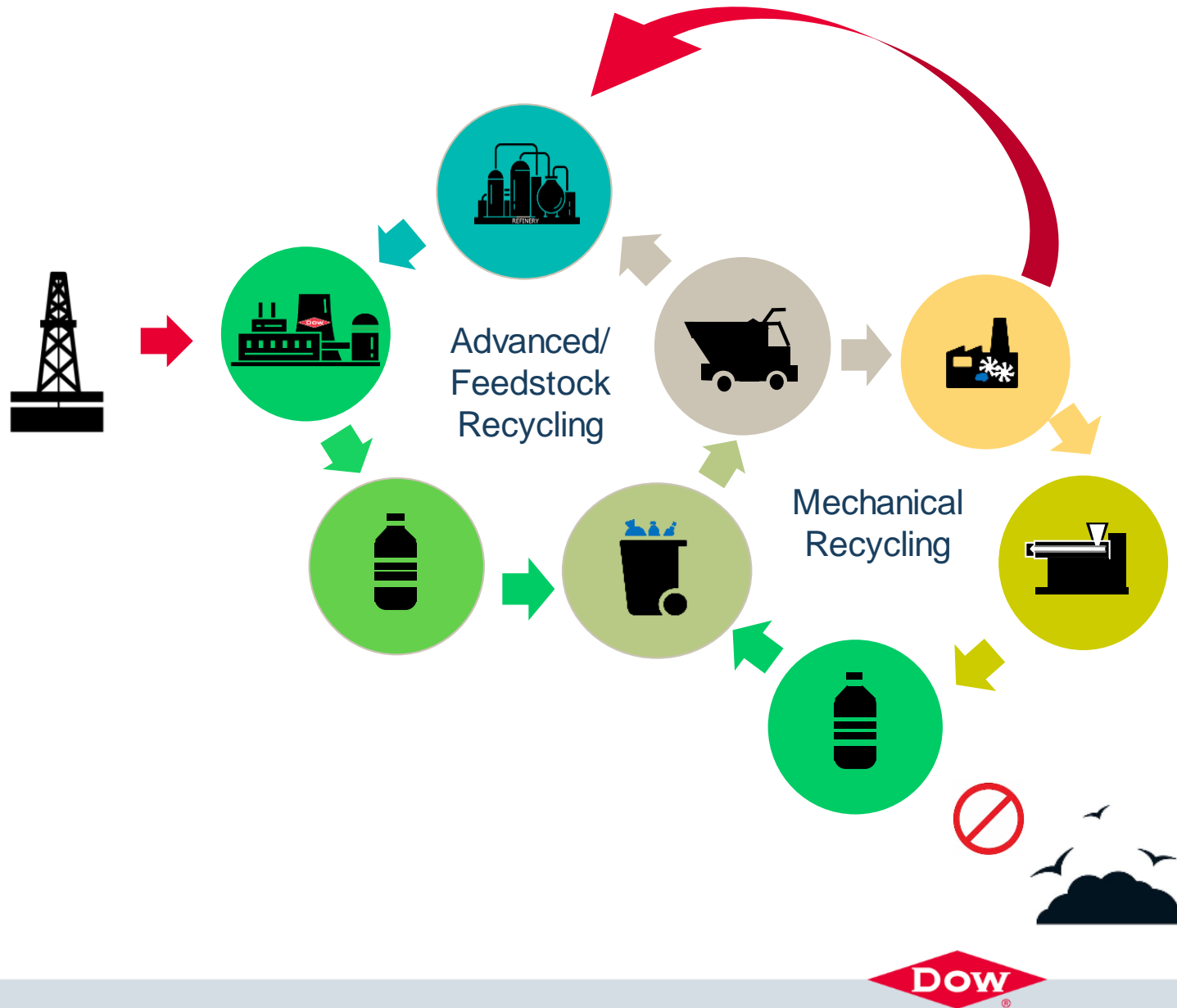


STOP THE WASTE: By 2030, Dow will help “stop the waste” by enabling 1 million metric tons of plastic to be collected, reused or recycled through its direct actions and partnerships.

CLOSE THE LOOP: By 2035, Dow will help “close the loop” by enabling 100% of Dow products sold into packaging applications to be reusable or recyclable.



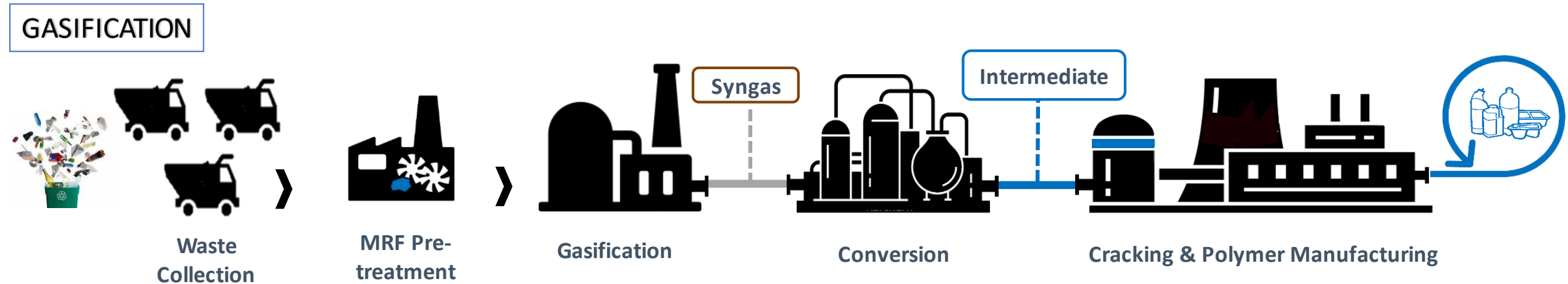
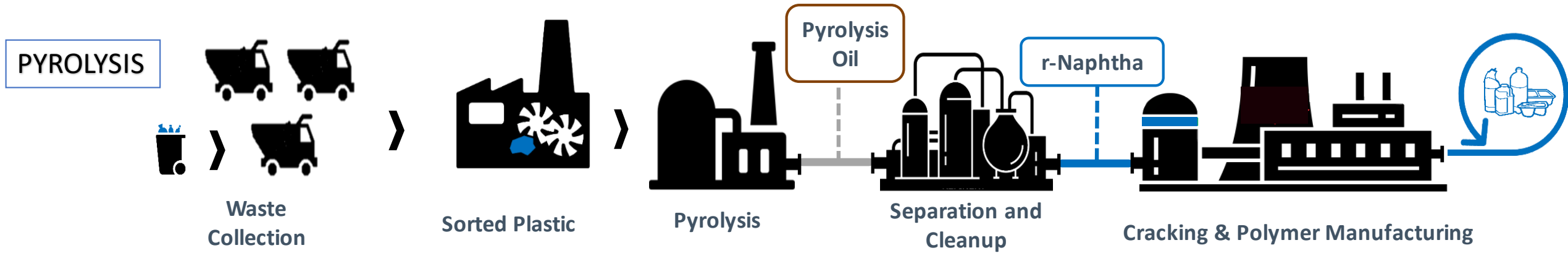
PLASTICS CIRCULAR SOLUTIONS



Key Questions:

- How do we evaluate competing factors – CO₂, Waste Reduction, Cost, Energy, Scalability, Selectivity?
- Value chain Partnerships
- Will Consumers Value these Solutions
- What Scale is Necessary to Demonstrate Meaningful Impact - Near Term and Long Term
- Distributed vs Integrated Solutions

FEEDSTOCK RECYCLING FOR BUILDING BLOCK RECOVERY



Considerations: 1) Product Yield 2) Sorting/cleaning cost, 3) Scale of waste vs ethylene, 4) Capital Intensity, 5) LCA

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*Executive Director,
Research & Innovation Center*
National Energy Technology Laboratory

Fossil Energy: Fueling the Nation

A Changing Ecosystem

80%

3M

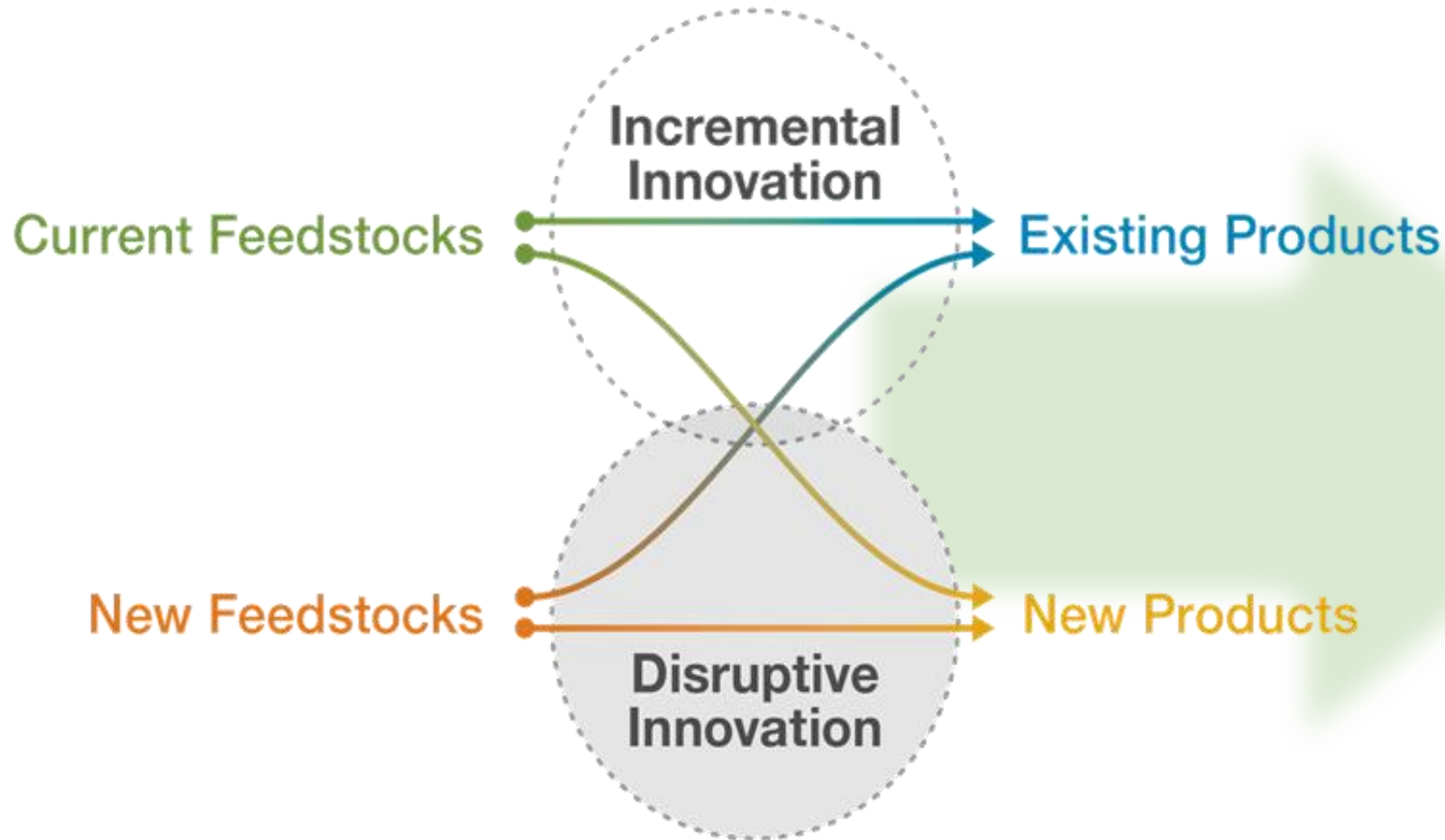
\$856B

2x



Chemical Sector

The Decision Equation Is Changing



**Drive the
Economy
-AND-
Protect the
Environment**

Driving Innovation. Delivering Solutions.

Solving the New Equation



>60,000
Staff

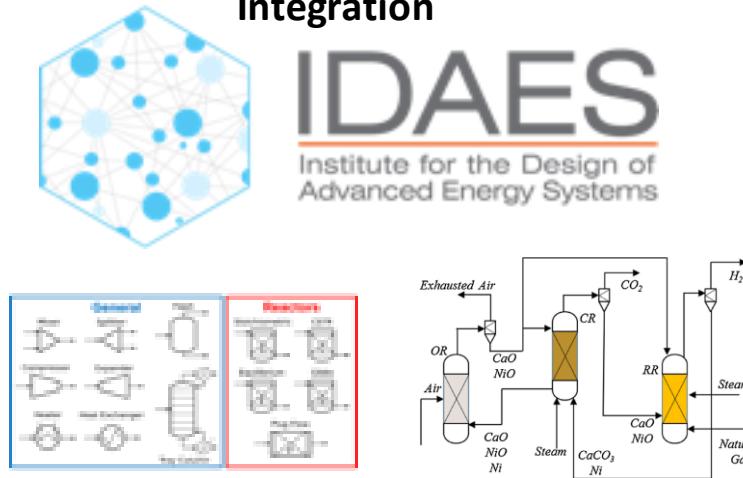
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Infrastructure



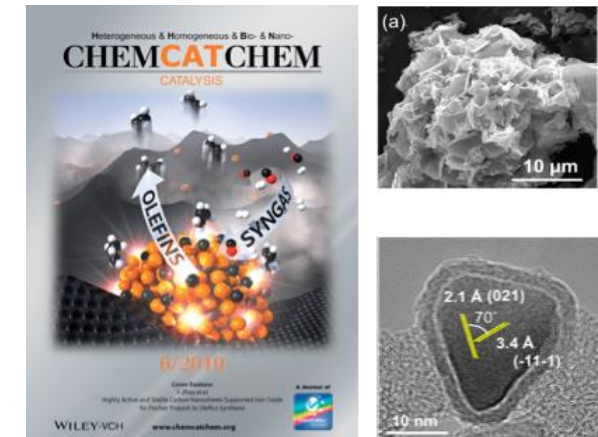
Cradle to Grave Environmental Footprints



Process Design, Optimization & Integration



Material & Device innovations



Natural Gas Utilization Key Lab Initiative



Partnership Is Key

Need

- Identify more uses and get products to market faster, at lower cost, and with zero environmental impact.
- Industry and the U.S. government must develop a more agile, less brittle chemical supply chain.
- Infrastructure to create an innovation center that transforms the downstream chemicals sector.

Approach

- A variety of partnership models
 - advance broad knowledge;
 - drive innovation and deliver solutions to create advantage with;
 - easily assignable IP and;
 - Provide a conduit to leverage the lab complex

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THANK YOU!

Please submit your questions in the Zoom Q&A function!

Looking for additional conversation and networking?

Join us in the Peer Connections Lounge after the live Q&A!